Patent: 09/654,987

IN THE CLAIMS:

Claim1. (Previously presented) A process for sealing at least one polymeric material to a Polymeric catheter tube, comprising the steps of:

providing a catheter tube having a first predetermined bonding location and a second predetermined bonding location for bonding a polymeric material thereto, each bonding location separate from each other and having a polymeric material overlapping the catheter tube at the bonding location;

simultaneously generating a first and a second annular beam of electromagnetic energy from two separate energy sources, the first beam being at least partially absorbable at a selected energy wavelength by at least one of the polymeric material at the first bond site location and the catheter tube and the second beam being at least partially absorbable at a selected energy wavelength by at least one of the polymeric material at the second bond site location and the polymeric catheter tube;

controllably directing the first annular beam of electromagnetic energy by redirecting the first beam with a parabolic mirror onto the polymeric material to concentrate the energy in the first bond site location so as to at least partially melt at least one material selected from the group consisting of the polymeric material and the polymeric catheter tube along the first bond site location and immediate regions thereof;

and controllably directing the second annular beam of electromagnetic energy by redirecting the first beam with a parabolic mirror onto the polymeric material to concentrate the energy in the second bond site location so as to at least partially melt at least one material selected from the group consisting of the polymeric material and the polymeric catheter tube along the second bond site location and immediate region thereof; and

allowing the at least two partially melted materials to cool and solidify to form a fusion bond between the polymeric catheter tube and the polymeric material.

Claim 2. (Previously presented) The process of claim 1 wherein the polymeric material is a polymeric balloon material.

Claim 3. (Previously presented) The process of claim 2 wherein the energy is substantially monochromatic.

Claim 4. (Previously presented) The process of claim 2 wherein the energy is not substantially monochromatic.

Claim 5. (Previously presented) The process of claim 2 wherein the energy is at least partially absorbed by the polymeric balloon material and the polymeric catheter tube.

Claim 6. (Previously presented) The process of claim 2 wherein at least two annular beams of electromagnetic energy are generated.

Claim 7. (Previously presented) The process of claim 6, the polymeric balloon material having a proximal end and a distal end, wherein a first annular beam is directed at the proximal end of the polymeric balloon material and a second beam is directed at the distal end of the polymeric balloon material.

Claim 8. (Previously presented) The process of claim 7 wherein the first annular beam is directed to the proximal end of the polymeric balloon material at the same time that the second beam is directed to the distal end of the polymeric balloon material.

Claim 9. (Previously presented) The process of claim 2 wherein the polymeric material is formed from the polymer selected from the group consisting of: polyesters, polyolefins, polyamides, thermoplastic polyurethanes and their copolymers, polyethylene terephthalate, nylon, and combinations thereof.

Claim 10. (Previously presented) The process of claim 2 wherein the energy is at least partially absorbed by the polymeric balloon material causing the polymeric balloon material to at least partially melt.

Claim 11. (Previously presented) The process of claim 2 wherein the energy is at least partially absorbed by the polymeric catheter tube causing the polymeric catheter tube to at least partially melt.

Claim 12. (Previously presented) The process of claim 2 wherein the energy is at least partially absorbed by the polymeric catheter tube causing the polymeric catheter tube to at least partially melt and by the polymeric balloon material causing the polymeric balloon material to at least partially melt.

Claim 13. (Previously presented) The process of claim 1 wherein the polymeric material is a retention sleeve.

Claims 14-15 (Canceled).

Claim 16. (Previously presented) The process of claim 1 wherein the annular beam is not substantially circular.

Claims 17-33 (Canceled).

Claim 34. (Previously presented) The process of claim 1 wherein after being generated the annular beam is redirected by passing through a lens.

Claim 35 (Canceled).

Claim 36. (Previously presented) The process of claim 1 wherein each annular beam is generated and directed through the use of a lens.

Claim 37. (Previously presented) The process of claim 36 wherein each annular beam is generated and directed through the use of two lenses.

Claim 38. (Previously presented) The process of claim 1 wherein a portion of the annular beam is blocked.

Claims 39-54 (Canceled).

Claim 55. (Previously presented) A process for bonding at least one polymeric material to a polymeric catheter tube having a longitudinal axis extending beyond each end of the polymeric catheter tube, comprising the steps of:

over-lapping a portion of the at least one polymeric material with a portion of the polymeric catheter tube thereby creating an over-lapped portion;

generating an annular beam of electromagnetic energy such that the annular beam is disposed about the longitudinal axis of the polymeric catheter tube without impinging on the polymeric material or the polymeric catheter tube, the electromagnetic energy at least partially absorbable by at least one of the polymeric material and the polymeric catheter tube at a selected energy wavelength;

controllably redirecting at least a portion of the annular beam of electromagnetic energy such that it converges onto the polymeric material at the over-lapped portion circumscribing at least a portion of the polymeric catheter tube to at least partially melt at least one material selected from the group consisting of the polymeric material and the polymeric catheter tube along at least a portion of the overlapped portion.

Claim 56. (Previously presented) The process of claim 55, wherein there is a plurality of annular beams, each annular beam to be directed to the overlapped portion is substantially disposed about the longitudinal axis of the catheter tube.

Claim 57. (Previously presented) The process of claim 55, wherein the polymeric catheter tube in the region of the overlapped portion has a circular cross-section.

Claim 58. (Previously presented) A process for sealing at least one polymeric material to a polymeric catheter tube, comprising the steps of:

over-lapping a portion of the at least one polymeric material with a portion of the

polymeric catheter tube thereby creating an over-lapped portion, the polymeric catheter tube having a longitudinal axis;

generating a beam of electromagnetic energy which is substantially annular, the electromagnetic energy substantially undivided in the annular direction, the electromagnetic energy at least partially absorbable by at least one of the polymeric material and the polymeric catheter tube at a selected energy wavelength;

controllably redirecting the annular beam of electromagnetic energy such that it converges onto the polymeric material at the over-lapped portion circumscribing the catheter tube to at least partially melt at least one material selected from the group consisting of the polymeric material and the polymeric catheter tube along at least a portion of the overlapped portion.

Claim 59. (Previously presented) The process of claim 58, wherein the annular beam has a substantially continuous and substantially uniform distribution annularly.

Claim 60. (Previously presented) The process of claim 58, wherein the at least one partially melted material is allowed to cool and solidify to form a seal or bond between the polymeric catheter tube and the polymeric material.